Environnement Humain/EHU-1

Cardiorespiratory Responses during Affective Picture Viewing: Metabolic and Attentional Aspects

Gomez P.

Institut de Santé au Travail

Several lines of research point to a hierarchical structure of emotion with the affective dimensions of valence (degree of pleasantness) and arousal (degree of activation) as strategic determinants of emotion. Pictures, for their ecological validity, have been widely used to evoke and investigate affective reactions in the laboratory and they were adopted in this study. Reactions of most individuals to positive and negative arousing images activate phylogenetically primitive motivational systems. Several somato-physiological measures covary to a certain degree with self-reported valence and arousal evaluations.

The goals of this study were multifold:

- to replicate previous findings concerning the relationships between breathing variables and self-rated valence and arousal;
- to assess to which extent changes in ventilation are in equilibrium with metabolic activity;
- to determine the level of visual attention involvement during picture viewing;
- to extend our knowledge about autonomic responding by measuring blood pressure (a rather neglected parameter in emotion research).

Thirteen picture series, each one of a different content (e.g., erotic couples, nature scenes, mutilated bodies, household objects), were shown to 41 subjects (20 men, 21 women, aged 18-38 years), while breathing parameters (i.e., inspiratory time, expiratory time, inspiratory volume, flow parameters, thoraco-abdominal balance), end-tidal pCO2, heart rate, blood pressure, skin conductance, spontaneous eye-blink rate and affective judgments were recorded. Series consisted of ten pictures of 6-s duration each. Mixed effects regression models were used to assess the relationships between affective judgments and physiological measures. The models tested included a random intercept for each subject and fixed effects for valence, arousal and the interaction term. Sex effects were also tested.

More negative valence ratings were associated with larger heart rate deceleration, lower eye-blink rate, and lower end-tidal pCO2. Sustained heart rate deceleration and blink rate inhibition are indicative of increased attention to aversive stimuli and lower pCO2 contributes to heightened sensory perception. We interpret these relationships in terms of an attention bias towards negative stimuli. With increasing arousal, minute ventilation, inspiratory volume, skin conductance and blood pressure increased. These relationships suggest increased energy mobilization in response to both positive and negative arousing stimuli and confirm that breathing parameters are more consistently related to arousal than valence. The ventilatory changes along the arousal dimension are in balance with metabolic activity. Importantly, the arousal effect for blood pressure was limited to the male subjects indicating a sex difference in the reactivity to high-arousal events on this specific parameter.
An important, yet not exhaustively answered question is how and to what extent physiological reactions to affective challenges influence human well-being. To be able to address this question we first need to refine our understanding of the physiological, cognitive and behavioral emotion systems. By investigating a broad range of psychophysiological responses to affective pictures from a two-dimensional perspective of emotion, this study enriches our knowledge about the connection between the subjective realm of the emotions and their neurophysiological substrate.

CENTRE HOSPTALIER
UNIVERSITAIRE VAUDOIS

UNIL | Université de Lausanne
Faculté de biologie
et de médecine

Comité d'organisation 2007

Angelika Bischof Delaloye, Médecine nucléaire

Rolf Gruetter, Centre d'Imagerie biomédicale

Jean-Daniel Horisberger, Décanat

Reto Meuli, Radiodiagnostic et radiologie interventionnelle

Andrea Volterra, Biologie cellulaire et morphologie

Administration de la Recherche :

Jovan Mirkovitch

Anne Tricot

Coraline Fraga

Table des matières

Couverture : Photo du Dr Yann Bernardinelli, Département de Phyiologie, Université de Lausanne
« Hippocampal astrocytes ensheeting a blood vessel.»